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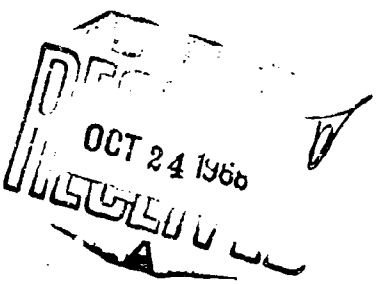


DEPARTMENT OF THE ARMY
Fort Detrick
Frederick, Maryland

# Smallpox Epidemic in Vannes, France from December, 1954 to March, 1955

by

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Smallpox Epidemic in Vannes, France.

Although a smallpox epidemic has been a rare happening in France during the last fifty years, as a result of the law of 1902 on vaccination and obligatory jennerized re-vaccination, few small localized epidemics have appeared, during the last fifteen years dermatology service of M. Flandin in 1942; Calais in 1946; Marseille in 1952 with 39 cases and 4 deaths; Brunehamel in Aisna in 1953 with 16 cases. Finally Vannes in 1955, with 73 cases and 16 deaths.

Certain circumstances seem to favor recurrence of the smallpox virus activity: population movements, social upheavals, speed of air communications, smallpox endemics or epidemics in Black Africa or in Indo-China, finally negligence and laxity in the re-vaccination system, even in the first vaccination.

We have also felt that it was not useless to instruct doctors on the practical and clinical observations that were made during the recent epidemic at Vannes. They are rich in information; certain aspects seem to call for a revision or reconsideration of a few classical notions in connection with the incidence of recent vaccination on smallpox, or atypical, ineruptive forms of infection, as previously quite correctly observed by the Marseille authors in 1952. Other facts seem to have widened the horizons on the pathogenics of smallpox and the means of entrance of the virus: these are observations made by one of us on the particle radiological pulmonary aspects which appeared in certain

during the epidemic.

We plan to study the epidemiological aspects of smallpox at Vannes; the clinical aspect taken by the epidemic; the incidences of the jennerian vaccination on the infection: the biological considerations revealed by the laboratory; and the observations to which we were lead by the various therapeutics used with our patients.

Each of these chapters, limited to their essential traits by the lack of space, will be made the subject of a deeper study which we plan to publish in the future in the form of one manuscript.

1. Epidemiology.

Two circumstances cooperated in the spread of the epidemic and at the same time contributed to limiting it exclusively to the hospital at Vannes.

a1. Medical circumstances.

Mistaken diagnosis of the first smallpox case (a child) and its admission to pediatrics, resulting in the contamination of 8 children being treated in the pediatric section and of one employee of that section;

a2. Administrative hospital circumstances.

The absence of an isolation section for contagious cases and a boxing-off of doubtful cases, and its coexistence with a 40 bed section of general medicine, in one and the same building, with two separate service heads, both sharing the same personnel, had as a consequence as soon as the first infected children were transferred from pediatrics

to the contagious section, involvement of the entire building, that is to say, certain patients previously hospitalized as contagious, and the entire medical service as well as 38 patients under treatment for previous infections.

On the other hand as soon as the nature of epidemic was recognized measures were adopted for the contaminated building (patients and personnel) and the prophylactic measures adopted (systemic vaccination of the hospital patients, isolation of the hospital, careful epidemiological research and finally obligatory re-vaccination of the total opoulation) soon isolated the epidemic and made it an epidemic important in numbers but one that was strictly intra-hospital, or a total of 56 cases to which must be added 17 previously affected without being hospitalized but who had either professional or occasional contact with smallpox patients.

In total the epidemic struck 73 individuals distributed as follows:

1. The first case: an infant foreign to the hospital.

2. The cases of second and third generations (72 cases) or:

| | |
|---|---|
| Children being treated at the hospital (pediatrics of contagion) ..... | 16 |
| Adults working in medicine (38 hospitalized) ..... | 30 |
| Hospital employees ..... | 6 |
| Doctors ..... | 4 |
| Older people in the General Hospital (next to the hospital) ..... | 6 |
| Patients contaminated outside the hospital in accidental contact with smallpox patients (pabents, friends, surrounding personnel) ..... | 9 |
| Isolated cases outside the hospital that was not tied into any certain origin due to the reticience of the patient ..... | 1 |
| Cases Total | 73 |

All of these 73 cases were characterized by a confirmed smallpox, that is to say with ruption.

Evolution of the Epidemic.

First generation, - Began: 9 December 1954. Admission in pediatrics of one case.

The child was a Roger D..., two years old. Uncertain, little swelling and with 39° fever and general normal state. Isolation; spectacular amelioration caused by terramycin both oral and parenteral. Fever dropped in three days. Desiccation. Scabs than decreasing and the child returned the 28 December to its home apparently cured.

Subsequent epidemiological study brought conviction that it was contaminated by a piece of clothing brought back from Indo-China or by his Father who had returned from Indo-China.

Second generation, - 9th - 21st December: free inteval, silent and misleading.

The 19th of December, a child, two years old, Roger P... who had been hospitalized in pediatrics for otitis and had left the section healed on the 11th of December, returned again with hyperthermia at 41°.

On the 21st of December, a papulo-pustulous eruption compelled the transfer of this child to the contagious section.

Thus on the 21st of December, or 12 days after the first case, the smallpox, still clinically unrecognized, entered the contagious section under the guise of an eruption with an uncertain diagnosis.

On the 22th to the 31st of December, there were 7 other hospitilized children in the pediatric's section, having papulo-pustulous eruptions

of a similiar type and were being immediately transferred to the contagious section, an employee of pediatrics contracted a similiar eruptive infection, but was cared for at her home with a diagnosis of atypical chicken-pox.

Under these circumstances, and after consultation among the colleagues competant because of their medical practice in Africa and extreme Orient, the clinical diagnosis was forced upon the head of the pediatric section, who in the absence of the chief of the contagion section, who remained in his room because of a fever condition, takes upon himself, to order the taking of pustulous secretion which was sent to the Pasteur Institut for biological diagnosis; to isolate the now on contaminated pediatrics contagions and medical sections, and to institute a general systematic re-vaccination of the entire hospital and of the general hospital(old people), both for the patients and for the medical personnal. The departmental director of health is alerted and he returns to Vannes on the 1st of January.

On the 3rd of January, 1955, the Pasteur Institut confirmed the diagnosis of smallpox, while the epidemic spread. Ten children and one adult have been contaminated; there have already been two deaths; the six month old patient from the orphanage is hospitalised in the pediatric section and one eight months old nursing infant convalesing from toxicosis; while one case is conspicuous at Molac, a two year old child was hospitalised in pediatrics in December, who will be treated at his home until his recovery and the 3 employees of the medical pavillon, from now on called Smallpox Pavillon, also contracted the disease.

The heads of the contagious and medical sections were not available because of a highly infectious and very feverish state of which we will speak later and the head of the dermatology section is given charge of the Smallpox Pavillon.

Third generation, - From the 4th to the 18th of January.

The epidemic spreads to the center of the Pavillon and progressively to the following patients;

30 adults of the medical section out of 38 cases.

3 children in the contagious section; one convalescing poliomylitis; one convalescing gastro-enteritis patient; one 4 year old child, recovered from cerebro-spinal meningitis was returned to his home on the 30th of December.

1 infant in the crib.

1 child in surgery, contaminated in December by an indirect fortuitous contact with the medicine.

1 child with chicken-pox, who had entered the section at the beginning of January with a faulty diagnosis of smallpox.

8 adults not connected with the hospital area fortuitously are contaminated by contact with patients in incubation, they are being sent to the hospital.

1 child contaminated indirectly under the same conditions.

6 hospital employees.

3 doctors.

1 isolated case which had had no contact with the hospital.

For a total of 55 new patients.

Fourth generation, -.Finally from the 20th of January to the beginning of March.

A few isolated cases, ( approximately one a week) mark the final stages of the epidemic, and begin with a case of an old man at the hospital contaminated with smallpox the third of February, after disregarding the prophylatic orders prescribed by the hospital; this case later contaminated: one doctor, chief of the Service section of the General Hospital and five old men.

Indirect Contamination.

All these patients were contaminated by direct contamination, with the exception of 5;

Cases 2 and 3 of the epidemic were contaminated not by primary cases which had been isolated in a box at the pediatric section, but by healthy hospital personnel.

Three other cases also children, were indirectly contaminated, one by a healthy wife of a previous patient;

The second in the school area of a religious teacher, while this child was not in the classroom of this teacher;

The last, hospitalized in surgery, seem to have been contaminated by a healthy wife of a patient in the medicine section, who had been visited by his wife before he had been sent to the hospital while the disease was in incubation but not recognized at the beginning of the epidemic period.

II. Clinical aspects of the Epidemic.

Let us first recall the clinical aspects and the very classical evolution evolution observed during the epidemic:

Silent and constant incubation from 10 to 12 days;

Stormy invasion from 2 to 4 days with hyperthermia at 40° or higher: general acute infectious state, myalgia, headaches, rachialgias, lumbago, extreme asthenia or prostration, vomitings, nausea, oliguriae, sweats, hypotension, variable pre-eruptive rash:

Eruption beginning on the face, than spreading to the body and limbs, dissemination. First erythemato-papulous, later pustulous or blisters. All the elements are of the same age numbering from 100 to 200. Favorite areas: at the extremities: face, palms and soles, deeply entrenched in the skin. Thick and resistant epidermis covering the blister. Certain elements, abortive, like lead grains or hardened acne-form, indolence, inconstant itching. Defervescence follows the eruption and the reduction of certain general signs;

Slow evolution in 10 to 14 days, umbilication than dessication and slow decrustation until the fourth day.

Clinical facts as to Acuteness.

The acuteness of infection is a function of intensity and of the dissemination of the eruption which is connected with importance of the toxic-infectious factor.

Schematically, we may distinguish:

1. Common forms of average intensity. Disseminated eruption, 100 to 300 generalized elements, vesicular or pustulous: severe general state, but not alarming, weakness, hypotension, constant albuminuria.

Favorable evolution in 15 to 20 d s.

Eviction after 40 days.

This clinical sequence has been observed in 23 cases during the epidemic: 12 children, 11 adults.

It should be noted that among these 11 adults or old people: 4 have died, not because of the acute stage of smallpox but because of their prior infection made worse by the smallpox; 2 old people (72 and 81); 1 purulent pleursy (32 years old); 1 multiple sclerosis (56 years old).

2. Rapidly mortal acute types. Extremely alarming general toxic infectious state: prostration: weakness; ataxopdynamic;delirium; agitation; habitual hyperthermia.

Generalized eruption rapidly confluent without intervals of healthy skin, or coherent with cutaneous patches detached from the derma, cloudy liquid; loose elements of flaccid aspect; hypotension muffling of the heart sounds; cardio-vascular collapse; oliguria, even anuria; hemorragoric tendency in the liquid of the pustules, spontaneous at points of medical injection or on the mucous, vomitings, kerato-conjunctivitis, evolution towards coma and death in from 2 to 10 days by broncho-pneumonia.

Uremic anuria nephritis, hemorragoric purpura or toxic-infectious coma recalling the malignant syndroms of infectious diseases.

The epidemic allows one to group 9 fatal cases in this order: 5 children; 3 from broncho-pneumonia; 2 from toxic-infectious coma.

4 adults: 1 anuria nephritis (44 years old); 2 purpuras, one of which was fulvinant (22 years old and 74 years old); 1 toxi-infectious

coma (62 years old).

It is of interest to point out that the two patients who died of hyper-acute purpura (hemorragic smallpox) which appeared at the end of the epidemic period, died in 24 to 36 hours, with an insignificant eruption as if the infection having raced ahead did not leave time for an eruption to take place.

3. Attenuated abortive types. The picture of the epidemic remains rampant and nothing allows one to decide at this point what type of an eruption will take place and how acute the infection will eventually be.

On the other hand, the eruption is at first discrete in its poverty: rare elements: isolated or grouped which have to sometimes be searched for mythodically to be discovered(from 1 to 20 elements).

Certain elements are pustulous, others abortive, of vesiculab aspects, acneform or simply papulous, but always hard and deeply incrusted into the skin.

The epidemiolggical interest of these forms, either abortive or incomplete cannot be belittled, since more than for all other types, the diagnosis could easily be mistaken and confused with an abortive case of chicken-pox, a pustulous acne, pyodermitis or localised folliculitis, if the notion of epidemicity is neglected for a long period. These forms are more easily neglected than any others, sometimes going without medical care, thus favoring the propagation of the disease, since the infectiousness remains active.

On the other hand, the fear of not recognizing an abortive case of smallpox carries the risk of making this diagnosis during

any other light vesico-pustulous eruptions; such was the case of the child hospitalized for smallpox during a period of dessiccation and who contracted true smallpox 12 days later, smallpox which he had contracted in the contagious section where he had been brought suffering from a non-recognized case of chickenpox 12 days before.

This is why all contagious sections should have isolation chambers for suspect or doubtful cases; this is why, as a rule one should always take account of the notion of epidemicity and the subject-contact allowing for reconstruction of the origin of every case, especially always keeping in mind the idea of the syndrome of severe infectious invasion with hyperthermia at 40° and an alteration of the general state. This phase of invasion hardly ever is lacking.

When in doubt, never hesitate to have a biological diagnosis of smallpox taken by qualified laboratories of virology. These forms evolve rapidly toward a cure, however leaving a certain asthenia and light anemia.

Depending on the case they last from 20 to 30 days.

The Vannes epidemic permitted grouping 41 cases of this type among which were 3 fatal cases among adults of the medical service, because of aggravation of their previous state:

cirrhosis (46 years old) ..... 1
tubercular mediatinitis(47 years old). 1
old man (80 years old from General Hospital ..... 1

These 41 patients are grouped as follows:

| | |
|---|---|
| Old people from the General Hospital ..... | 5 |
| Doctors ..... | 3 |
| Hospital employees ..... | 6 |
| Adults ..... | 25 |
| Children ..... | 2 |

It should be noted that among 11 old men aged from 73 to 86 years who contracted smallpox, 4 died during the epidemic.

### III. Special Aspects as to Limits of the Smallpox.

Some very special clinical or radiological aspects observed in the course of this epidemic, whether in subjects having escaped smallpox in spite of a contact with patients infected during the eruptive period, whether among patients having contracted an abortive attenuated case, raises important problems on the theoretical and practical plan, concerning on one hand the eventuality of pure febrile uneruptive forms of smallpox admitted by the Marseilles authors, and on the other hand, the existence of special pulmonary manifestations linked in one way or another to the infection by the smallpox virus.

1. The first assertion concerns the case of 25 patients who had no eruption but who, ten or twelve days exactly after a contact with smallpox presented a syndrome of acute infectious fever with generally accented signs characteristic of pseudo-grippe, in which the clinical context recalls in all points the syndrome of smallpox invasion: hyperthermy, nausea, asthenia, headaches, rachialgias and

sometimes an erythematous rash or fleeting meninges.

These 25 patients were composed of 5 doctors, 3 hospital interns 3 female agents among the hospital personnel (pediatrics), 1 male agent, 3 hospital nuns, 1 hospital worker, 2 students in the infirmary, 6 children in pediatrics, 1 woman hospitalized as incurable at the General Hospital. It is to be noted that all had professional contacts repeatedly with smallpox patients, both before and after their re-vaccination.

16 of them presented an isolated infectious syndrome, without eruption and without radiological modification of the pulmonary picture, while the other 9 had a general infectious syndrome without vesicular eruption, with respiratory manifestations more or less acute, accompanied by radiological modifications often important and partially labile, of the pulmonary picture.

These aspects recall sometimes pictures of certain atypical, viral pneumonopathies with badly refined regions of moderate condensation, not homogenous and soft; sometimes those of the infiltrates of Loeffler's syndrome even the tuberculous infiltrate of Assman's focus; sometimes even that of primary chancre. At times these pulmonary aspects are silent clinically, without functional or physical sign. At other times they are accompanied by respiratory symptoms: thoracic pain, dyspnea, dry cough, discrete stethacoustic signs.

These first facts by themselves were already suggestive and evocative and raised the question of a relation between these infectious states and the pulmonary aspects, especially on the 10th day after contact with a case of smallpox on one hand and smallpox virus on the

other hand. Everything combined to presume that there must exist a relationship between these morbid states and the smallpox virus, and the problem was one of the reality of the pure, aneruptive febrile forms of smallpox. But nothing gave proof of the intervention of virus. Only negative signs among the patients incited discarding the hypothesis of an atypical viral pneumonopathy, cold agglutinins having never been found in them, and bloody eosinophilo, on the contrary, having been noted often. These facts merit particular attention, and will be the object of a later detailed study by one of us.

2. The second assertion made in the course of this epidemic is of no less interest since it carries proof that there may exist a relation between the aforementioned pulmonary picture to the infiltrate type of variola virus. In fact, in several patients with confirmed smallpox, with discrete and attenuated eruption, poor in elements, there were observed at the decrease of the eruption, radiological pulmonary aspects more or less labile, with or without clinical expression, in all points similiar to those observed in the preceding cases without eruption. Thus the bridge was launched which linked the aneruptive forms to the weak eruptive forms of smallpox (5 observed on 12 studied systematically). All terms of transition existed between the extreme types )pure febrile forms without radiological signs and forms confirmed with pulmonary signs).

All these facts, we repeat, will be the object later of a serious study. Practicians must henceforth be found to make a systematic study of the research and investigations in the course of eventual

epidemics of smallpox and raise new questions of the epidemiological and immunological type, on whether or not the aneruptive forms are contagious, and on the significance of these pulmonary forms on pathogenicity, allergy and immunology.

As far as the epidemic at Vannes is concerned, everything occurred as though these forms without eruption (pure febrile or pulmonary) had been non-contagious.

## IV. General Statistics

### A. - Confirmed Eruptive Smallpox.

1. Total number of cases registered in the epidemic: 73 cases

| | | |
|---|---|---|
| Number of children | 18 | |
| Number of adults and aged | 55 | |
| Numbered of children contaminated outside hospital (the first case) | | 1 |
| Number of children hospitalized before contact and contaminated at the hospital | | 15 |
| Number of children contaminated outside hospital by contact with patient in infectious state | | 2 |
| Number of adults hospitalized ..... | | 20 |
| Number of aged ..... | | 6 |
| Number of hospital employees ..... | | 6 |
| Number of doctors ..... | | 4 |
| Number of patients contaminated after visiting visiting at the hospital or at the home of a patient .... | | 9 |
| | | 73 |

2. Number of deaths: 16 or 22%

| | Cases | Deaths |
|---|---|---|
| Children ..... | 18 | 5 (or 28%) |
| Adults under treatment (aggravation of former conditions) | 30 | 8 (or 27%) |
| Healthy adults who become contaminated | 15 | 1 (or 6%) |
| Doctors ..... | 4 | 1 |
| Aged in the General Hospital | 6 | 1 (or 16%) |

3. Clinical Types:

Average form: 23 cases

| | |
|---|---|
| Children | 12 |
| Adults or aged (of whom 4 died) | 11 |

These 4 deaths were linked to aggravation of the infection for which the patient was being treated at the time of eruption.

| | |
|---|---|
| Aged(72-81 years) | 2 |
| Purulent pleurisy(32 yrs) | 1 |
| Multiple sclerosis (56 years) | 1 |

Severe forms rapidly mortal: 9 cases

| | |
|---|---|
| Children | 5 |
| Adults or aged | 4 |

9 deaths

Children:

| | |
|---|---|
| Broncho-pneumonia | 3 |
| Toxi-infectious comas, convalescents of recent grave illness | 2 |
| | 5 |

Adults:

| | |
|---|---|
| Amuric nephritis(44 years) | 1 |
| Toxi-infectious coma (62 years) | 1 |
| Hyperacute purpura(22 & 74 years) | 2 |
| | 4 |

The 2 patients of 44 and 22 years were free of all apparent former infection.

Light forms: 41 cases

| | |
|---|---|
| Aged(General hospital) | 5 |
| Hospital employees | 6 |
| Adults | 26 |
| Children | 1 |
| Doctors | 3 |

Among these 41 patients there were registered 3 deaths caused by aggravation of a condition for which the patient was under treatment before the eruption:

| | |
|---|---|
| Ascitic cirrhosis (46 years) | 1 |
| Mediastinic tuberculosis(49 years) | 1 |
| Aged (80 years) | 1 |

We should underline that if the existence of an evolving affection prior to smallpox at the moment of eruption, has not necessarily influenced the clinical form of smallpox in favoring the appearance of a severe form, the high mortality of this epidemic has, however, been in part linked to the previous condition of certain patients who due to smallpox infection underwent a mortal aggravation.

The 5 deceased children were convalescent from a recent infectious state: toxicosis, suppurative otitis, cerebrospinal meningitis, congenital pyloric stenosis operated several months earlier, and 1 feeble-minded.

Among the 11 others who died, 4 were old people afflicted with senile cariopathy or hepatitis, and 5 others were adults with diverse evolutive affections. 2 only (1 doctor, 44 years old and 1 nun of 22, were apparently in full health before their infection).

B. Febrile Forms without Eruptions: 25 cases

| | |
|---|---|
| Doctors ..... | 5 |
| Hospital interns ..... | 3 |
| Nuns ..... | 3 |
| Female attendants of personnel(hospital | 3 |
| Male " " " | 1 |
| Students of infirmary ..... | 2 |
| Children in pediatrics ..... | 6 |
| Worker(painter) at hospital ..... | 1 |
| Woman of 49 years hospitalized as incurable. | 1 |

Among these 25 cases, 16 patients had a pure febrile form, isolated, and 9 patients associated to the General infectious syndrome a pulmonary syndrome of the labile infiltrate type, with or without clinical expression, but with constant modification of the radiological picture of the lungs:

| | |
|---|---|
| Doctor ..... | 1 |
| Intern ..... | 1 |
| Female attendant among personnel | 3 |
| Nuns ..... | 2 |
| Incurable patient in General Hospital. | 1 |
| Painter ..... | 1 |

C. Pulmonary Manifestations of Labile Infiltrate Type.

1. At the decrease of light eruptive smallpox: 5 cases among 12 patients examined;

2. In the course of infectious aneruptive syndromes: 9 cases aforementioned.

V. Incidence of Vaccination on Smallpox.

1. We must emphasize first of all, with the grave message that this implies, that among the 18 children treated for smallpox at the Hospital of Vannes, 15 of them, aged 9 years to 5 months, had never received the primary Jenner vaccination before 1 January 1955. Five of them died in this epidemic.

On the other hand, the child B..., aged 13 months, contaminated at the hospital nursery, had been vaccinated for the first time at the age of 5 or 6 months with very doubtful result and without apparent scar. On 2 January he had another vaccination followed by an early reaction on the fourth day with typical vesicular-pustulous vaccinal. And nevertheless on the 8 of January he had an eruption of smallpox confirmed by the Institut Pasteur; smallpox of medium intensity, certainly, without alteration of the general state, having progressed favorably and parallel to the vaccinal pustule. It all happened, in short, as if, the incubation having burst forth in the last days of December, the revaccination had intervened too late to secure effective premunition, but had helped nevertheless to attenuate the virulence o the infection.

2. In the second place it must be emphasized again that all adults who contracted smallpox were revaccinated before the appearance of infection, between 1 January (patients under treatment at the Hospital before their eruption), and 6 January (patients not hospitalized before their eruption and vaccinated with the population of Morbihan).

The majority of them had no reaction to the vaccination, this having intervened too late, since these patients were already in incubation. The question is presented, however, as to whether this vaccination too late to confer immunity, has not been helpful in assuring the patient an attenuation of virulence of the germ, or an exaltation of the defense reactions of the organism. The number of

patients in Medical Service with former affections, often grave, who came out victorious from this grave intercurrent infection, of which one rightly expected the worst consequences, plead in favor of such an hypothesis and incline one never to defer vaccination, even if it appears to intervene too late.

Concerning the 8 patients from Medical Service and 3 patients from Contagious Service who, in spite of their stay in the smallpox building did not contract the illness although they were in the same conditions of contagion and vaccination as other hospitalized cases who contracted smallpox, it is proper to ask if they had not bebefitted from a former acquired and lasting immunity. These 11 patients were: 10 adults, and 1 child of 18 months, vaccinated in his first year.

On the contrary we must remember the case of the sailor, M.K..., 32 years, revaccinated in July, 1953 (15 months before the epidemic) with a very doubtful and certainly very discrete papulous result, who contracted smallpox(a light, but eruptive case) on 12 January, from having been in contact with a smallpox child during the period of onset of infection. This sailor had not submitted to revaccination in January precisely because his last revaccination 15 months ago legally exempted him from systematic revaccination.

4. Concerning the 4 contaminated doctors, vaccination for three of them intervened in the hours which followed their first contact with smallpox patients (from two to eighteen hours afterwards). In spite of this revaccination and its negative reaction (Dr. T...),

erythematous immunity (Dr. G...,), our pupulous-pustules, moderated but definite (Dr. F...) infection of smallpox survived ten to twelve days after contact.

With one of them (Dr. D...) revaccination 18 hours after contact did not prevent development of confluent smallpox, exceptionally grave, terminated in death, in spite of a discrete reaction on the fourth day after vaccination.

As for Dr. D..., in the department of Aged, revaccinated 4 January without success (his earlier, long distant vaccination being unknown) he erupted 15 February, 12 days after his contact of 3 February with the first aged case of smallpox, that is one month after his unique revaccination without success, and even though he had had in January one or two contacts without being contaminated, in the smallpox building.

5. Finally, the population of Vaumes, closely followed by all the apartment, was revaccinated from 6 to 8 January. It is good to emphasize that no case was noted in the city nor environs, if one excepts the first case of the child D..., the 2 adults having had contact with a patient before the diagnosis was known and 1 child contaminated by one of these adults.

## VI. Treatment

There is no specific treatment for smallpox, not even treatment capable of modifying the evolutionary course of the disease, unless it be symptomatic and stimulant medications for general defense, proper and valuable for all severe infectious diseases.

That is why we believed ourselves authorized in the course of the epidemic to try a variety of therapeutics in severe cases.

As of the present, we can say that no one of these therapeutic trials ever seemed to modify the course of the disease, whether favorable or mortal.

1. Certain medications were instituted systematically with all the patients: These were cardio-vascular analeptics, cardiac tonics, antitoxic medications (suprarenal extracts, ascorbic acid), artificial physiological and glucose serums, and especially antibiotics: penicillin, terramycin, injectable and by mouth, and sometimes aureomycine or erythromycine together, not so much to act on the virus itself as to prevent secondary infection of pustules. And it can be stated that not once was there observed suppuration of eruptive elements, which contributed, perhaps, to there being no indelible scars, even in severe cases of generalized eruption, except in a few cases and on a number of very rare elements.

Xylol, administered by mouth in a dose of 122 drops for adults and 60 drops for children per day, was prescribed for a large number of patients, but it never appeared to be accompanied by appreciable results, except for the repulsion of the patients and the impossibility therefore, of prolonging this treatment more than two days.

Locally the skin was regularly cleansed antiseptically with solutions of biocidal powder and desogen.

2. Other medications were put to work in severe cases, in many patients without apparent success; 5 of these patients of whom

2 were children, succumbed to the infection. The other five, 1 of them a child, survived without our being able to attribute any appreciable role to medication.

Electrophoresis of serum of the patients showed in the severe forms an augmentation of globulins, as is observed in numerous states of tissue disintegration.

Concerning biological diagnosis of smallpox as it is practised at the Institut Pasteur, we can offer no personal light on the matter, having had no experience except with the conclusions of Pasteur. We cite, therefore, only the successive phases of this diagnosis in a number of our cases.

Electron microscope which permits no differentiation between the virus of smallpox and that of the vaccine.

Inoculation of monkey testicle.

And finally, Inoculation of chorio-allantois of chicken egg in incubation, which produces colonies whose particular aspect can be taken as specific.

## CONCLUSIONS.

Our attention was especially drawn in the course of this epidemic at Vannes by a certain number of things.

In the epidemiological plan we observed the rarity of indirect contamination.

From the clinical point of view, we noted the grave incidence of non-vaccination and of pre-existing affection, on the severity and evolution of smallpox.

Besides, we have had our attention particularly arrested by the clinical and radiological pulmonary manifestations, hitherto unknown appearing on the occasion of abortive smallpox, even aneruptive.

Finally, revaccination has not appeared to us to confer always the immunity expected, by reason of the too short interval between this and the contact with smallpox. But it seemed to us most often to play a not negligible role in attenuation of the infection.

The following were tried:

Perfusion of fresh isogroup blood of patients in whom the eruption recurred after 3 or 4 weeks.

Perfusion of fresh isogroup blood, non-variola.

Injection of serum of recent convalescents.

Massive injections of non-specific gamma-globulin.

Finally, injections of immune, non-specific serums, non-purified (antidiphtheria or antitetanus) associated or not with minimum doses of ACTH of cortisone ( 5-50 milligrams every 24 hours).

None of these medications effected any appreciable correction.

## VII. Laboratory.

The urinary syndrome was almost constant; albuminuria with occasional cylindruria and hypernitremia.

No syndrome of functional hepatic insufficiency, clinical or humoral, was observed in the course of the epidemic.

The hemogram was almost constantly modified.

Anemia moderate - between 3 and 4 million red blood corpuscles.

Hyperleukocytosis, to 10, 12 or 18, thousand leukocytes accompanied by relative neutropenia under 50% with sometimes light eosinophilia of 4 to 10%. Myelocytosis although classic was rarely noted. On the other hand, besides the excess of hyalin. of circulating blood, (monocytes, average mononuclear, lymphocytes) there were frequently observed 1 to 10 plasmocytes for 100 leukocytes.

It is to be noted that in the majority of cases, these disturbances appeared, not at the time of invasion as in classic descriptions, but at the eruptive phase.